HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

Hatchery Program:	Tumwater Falls Fall Chinook Yearling Program
Species or Hatchery Stock:	Fall Chinook (Onchorynchus tshawytscha) Deschutes River
Agency/Operator:	Washington Department of Fish and Wildlife
Watershed and Region:	Deschutes River and Percival Creek Puget Sound
Date Submitted:	, 2002
Date Last Updated:	August 21, 2002

SECTION 1. GENERAL PROGRAM DESCRIPTION

1.1) Name of hatchery or program.

Tumwater Falls (South Puget Sound) Yearling Fall Chinook Program

1.2) Species and population (or stock) under propagation, and ESA status.

Deschutes River Fall Chinook (*Oncorhynchus tshawytscha*)

1.3) Responsible organization and individuals

Name (and title):	Manuel Farinas, Operations Manager Rich Eltrich, Complex Manager	
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Other agencies, Tribes, co-operators, or organizations involved, including contractors, and extent of involvement in the program:

1.4) Funding source, staffing level, and annual hatchery program operational costs.

This program is funded through the State General Fund.

1.5) Location(s) of hatchery and associated facilities.

Tumwater Falls Hatchery: 114 Deschutes Way SW, Tumwater WA. 98501 Located at RM. 0.2 miles on Deschutes River (WRIA 13.0028).

McKernan Hatchery: W 411 Deyette Road, Shelton, WA. 98584. Located on Weaver Creek at ~ RM 1, tributary to Purdy Creek (WRIA 16.0005). Purdy Creek is a tributary to the Skokomish River (WRIA 16.0001).

Percival Cove Net Pens: Located in Percival Cove at RM 0.0 adjacent to Percival Creek (WRIA 13.0029).

1.6) Type of program.

Isolated harvest.

1.7) Purpose (Goal) of program.

Augmentation.

The goal of this program is to provide adult fish for harvest opportunity.

1.8) Justification for the program.

This program will be operated in a manner which will not negatively effect listed fish by releasing fish as smolts as programmed in the Future Brood Document (FBD). These fish are 100% mass-marked (adipose-fin clip only) which will allow for selective fisheries (harvest opportunity) in mixed stock areas to minimize impacts on weak or protected stocks as well as identifying the hatchery fall chinook production and the NOR/HOR spawning ground ratios.

1.9) List of program "Performance Standards".

1.10) List of program "Performance Indicators", designated by "benefits" and "risks."

Performance Standards and Indicators for Puget Sound **Isolated Harvest** Chinook programs.

Performance Standard	Performance Indicator	Monitoring and Evaluation Plan
Produce adult fish for harvest	Survival and contribution rates	Monitor catch and cwt data
Meet hatchery production goals	Number of juvenile fish released: **200,000**	Future Brood Document (FBD) and hatchery records
Minimize interactions with listed fish through proper brodstock management and mass marking. Maximize hatchery adult capture effectiveness. Use only hatchery fish	Number of broodstock collected - **110 adults for yearling program**	Rack counts and CWT data Spawning guidelines
	Stray Rates	Hatchery records
	Sex ratios	
	Age structure	Spawning guidelines
	Timing of adult collection/spawning - **September to late October**	Hatchery records

	Adherence to spawning guidelines - **1:1 with 5 fish pools**	
	Total number of wild adults passed upstream - **See sections 7.5 & 12**	
Minimize interactions with listed fish through proper rearing and release strategies	Juveniles released as smolts	Future Brood Document (FBD) and hatchery records
	Out-migration timing of listed fish / hatchery fish **May-June**	FBD and historic natural outmigration times FBD and hatchery records
	Size and time of release **8 fpp/April release**	CWT data and hatchery records (marked vs unmarked)
Maintain stock integrity and genetic diversity	Effective population size	Spawning guidelines
	Hatchery-Origin Recruit spawners	
Maximize in-hatchery survival of broodstock and their progeny; and Limit the impact of pathogens associated with hatchery stocks, on listed fish	Fish pathologists will monitor the health of hatchery stocks on a monthly basis and recommend preventative actions / strategies to maintain fish health	Co-Managers Disease Policy
	Fish pathologists will diagnose fish health problems and minimize their impact	Fish Health Monitoring Records
	Vaccines will be administered when appropriate to protect fish health	

	A fish health database will be maintained to identify trends in fish health and disease and implement fish health management plans based on findings	
	Fish health staff will present workshops on fish health issues to provide continuing education to hatchery staff.	
Ensure hatchery operations comply with state and federal water quality standards through proper environmental monitoring	NPDES compliance	Monthly NPDES records

1.11) Expected size of program.

1.11.1) Proposed annual broodstock collection level (maximum number of adult fish).

A total of 110 adults are needed to maintain this program. These adults are included in the total Tumwater Falls broodstock collection of 2,500 adults.

1.11.2) Proposed annual fish release levels (maximum number) by life stage and location.

Life Stage	Release Location	Annual Release Level
Eyed Eggs		
Unfed Fry		
Fry		
Fingerling		
Yearling	Percival Cove	200,000

1.12) Current program performance, including estimated smolt-to-adult survival rates, adult production levels, and escapement levels. Indicate the source of these data.

For broodyears 1986 through 1995 yearling production (excluding 87' and 93'), coded-

wire tag data indicates average smolt-to-adult survival was .70%.

Number of fall chinook passed above hatchery traps on the Deschutes River and Percival Creek (WDFW Hatchery Records):

	Deschutes River	Percival Creek[1]
1988	154	0
1989	970	1072
1990	5186	1083
1991	325	500
1992	428	56
1993	93	1
1994	1431	600
1995	4868	1100
1996	8232	3496
1997	1151	839
1998	1442	155
1999	223	1190

[1] Percival Cove counts include some estimates made after the pickets were removed from the trap.

Broodstock levels back to the hatchery rack for broodyears 1995 through 2001 were 24,720, 15,537, 4,016, 4,615, 7,250, 5,948 and 5,671, respectively.

1.13) Date program started (years in operation), or is expected to start.

1988 (releasing from Percival Cove net pen).

1.14) Expected duration of program.

Ongoing.

1.15) Watersheds targeted by program.

Deschutes River (WRIA 13.0028) and Percival Creek (WRIA 13.0029).

1.16) Indicate alternative actions considered for attaining program goals, and reasons why those actions are not being proposed.

NA

SECTION 2. PROGRAM EFFECTS ON ESA-LISTED SALMONID POPULATIONS.

2.1) List all ESA permits or authorizations in hand for the hatchery program.

None.

2.2) Provide descriptions, status, and projected take actions and levels for ESA-listed natural populations in the target area.

2.2.1) Description of ESA-listed salmonid population(s) affected by the program.

- Identify the ESA-listed population(s) that will be directly affected by the program.

None.

There are no ESA-listed natural salmonid populations in the program target area (Deschutes River/Percival Creek). Hatchery-origin fall chinook have been passed above Tumwater Falls periodically, but hatchery program egg-take requirements have been the first priority at this facility. As a result, fish passed upstream have, at times, been heavily biased to males or have been delayed to such a degree that they were in poor physical condition or were so mature that they spawned immediately in the less favorable habitat of the lower river.

Incidental chinook observations made in the Deschutes River "coho natural production" study indicate that there is some level of natural fall chinook production resulting from these releases. However, since hatchery production has not been historically 100% identified, the natural production has not been quantified. A research proposal (copy attached in section 12) has been put forth to measure the resulting smolt production and adult returns.

The available habitat in Percival Creek is not judged to be typical, productive fall chinook habitat and would not likely support a self-sustaining, naturally spawning fall chinook population. If the local hatchery production program was terminated, it is expected that natural chinook production in this watershed would eventually disappear. These opinions could be tested by identifying all hatchery fall chinook production in this watershed and monitoring natural production/productivity (see section 1.8).

- Identify the ESA-listed population(s) that may be incidentally affected by the program.

Nisqually Summer/Fall Chinook. Stock-specific spawning ground, juvenile life history, survival and productivity data are generally lacking for this natural population. The population is presumed to be similar in biological characteristics to the other South Puget Sound fall chinook populations (Puyallup River and Green River fall chinook). Adults are presumed to be predominantly 4-year-olds at return (likely 60-80%), with smaller components of 2-year-olds (<10%), 3-year-olds (10-20%), 5-year-olds (5-10%) and 6-year-olds (<1%). Size at age is expected to be similar to the data listed below for Puyallup and Green River fall chinook.

Chinook spawning habitat in the mainstem Nisqually River is available from RM 3 to just above the mouth of the Mashel River (approximately RM 40). Chinook have been documented spawning in the accessable reaches of the Mashel River and Ohop Creek. There is occasional chinook utilization of 25 Mile Creek, a tributary to Ohop Lake.

River entry of mature adults begins in July and extends through September. Spawning occurs from early September through October. Most Nisqually River fall chinook juveniles likely migrate to salt water as zero age smolts after only a few months of freshwater residence. If migration timing is similar to Green River stock, the outmigration likely peaks in May. After several weeks of estuarine acclimation and feeding, the juveniles move off to feeding grounds in Puget Sound and the Pacific Ocean.

South Sound Tributary Summer/Fall Chinook. Stock-specific spawning ground, juvenile life history, survival and productivity data are generally lacking for this natural population. The population is presumed to be similar in biological characteristics to the other south Puget Sound fall chinook populations (Puyallup River and Green River fall chinook), since it is thought to be dependent on ongoing hatchery production (strays) in south Puget Sound. SASSI defines this stock as naturally spawning chinook in a number of widely distributed rivers, including McAllister Creek, Grovers Creek, Gorst Creek, Chambers Creek, Carr Inlet tributaries, the Deschutes River and other small streams in south Puget Sound.

2.2.2) Status of ESA-listed salmonid population(s) affected by the program.

- Describe the status of the listed natural population(s) relative to "critical" and "viable" population thresholds

Critical and viable population thresholds under ESA have not been determined, however, the SASSI report determined that status of the South Sound Tributary Summer/Fall Chinook, and Nisqually Summer/Fall Chinook stocks are "healthy".

- Provide the most recent 12 year (e.g. 1988-present) progeny-to-parent ratios, survival data by life-stage, or other measures of productivity for the listed population. Indicate the source of these data.

Nisqually River fall chinook - Unknown.

South Sound Tributaries fall chinook - Unknown.

- Provide the most recent 12 year (e.g. 1988-1999) annual spawning abundance estimates, or any other abundance information. Indicate the source of these data.

Estimates of fall chinook spawning naturally in the Nisqually River:

Year	Spawning number

1988	1342
1989	2332
1990	994
1991	953
1992	106
1993	1655
1994	1730
1995	817
1996	606
1997	340
1998	834
1999	1399

Estimates of fall chinook spawning naturally in South Sound Tributaries:

Year	Spawning numbers
1988	4257
1989	4979
1990	15814
1991	3681
1992	3610
1993	2998
1994	4950
1995	7456
1996	14931
1997	4192
1998	6372
1999	11028

- Provide the most recent 12 year (e.g. 1988-1999) estimates of annual proportions of direct hatchery-origin and listed natural-origin fish on natural spawning grounds, if known.

Nisqually River fall chinook - Unknown. There are inadequate spawning ground sampling data to estimate proportions.

South Sound Tributaries fall chinook - Unknown, although SASSI states that stock status is dependent upon local hatchery production.

2.2.3) Describe hatchery activities, including associated monitoring and evaluation and research programs, that may lead to the take of listed fish in the target area, and provide estimated annual levels of take

- Describe hatchery activities that may lead to the take of listed salmonid populations in the target area, including how, where, and when the takes may occur, the risk potential for their occurrence, and the likely effects of the take.

Broodstock collection

Juvenile releases

- Provide information regarding past takes associated with the hatchery program, (if known) including numbers taken, and observed injury or mortality levels for listed fish.

Not known.

- Provide projected annual take levels for listed fish by life stage (juvenile and adult) quantified (to the extent feasible) by the type of take resulting from the hatchery program (e.g. capture, handling, tagging, injury, or lethal take).

See "take" table at end of HGMP.

- Indicate contingency plans for addressing situations where take levels within a given year have exceeded, or are projected to exceed, take levels described in this plan for the program.

SECTION 3. RELATIONSHIP OF PROGRAM TO OTHER MANAGEMENT OBJECTIVES

3.1) Describe alignment of the hatchery program with any ESU-wide hatchery plan (e.g. *Hood Canal Summer Chum Conservation Initiative*) or other regionally accepted policies (e.g. the NPPC *Annual Production Review* Report and Recommendations - NPPC document 99-15). Explain any proposed deviations from the plan or policies.

There are no applicable plans or policies.

3.2) List all existing cooperative agreements, memoranda of understanding, memoranda of agreement, or other management plans or court orders under which program operates.

Puget Sound Salmon Management Plan.

3.3) Relationship to harvest objectives.

3.3.1) Describe fisheries benefitting from the program, and indicate harvest levels and rates for program-origin fish for the last twelve years (1988-99), if available.

The Fishery Regulation Assessment Model (FRAM) predicts total 2000 fishery exploitation on this stock of 38%, with a total Washington fishery exploitation of 31% (FRAM run #0800, run with final 2000 regulation package). Predicted 2000 exploitation rates, by fisheries, are as follows:

Fishery	Predicted Exploitation Rate
Alaska	1%
Canada	6%
WA Treaty Troll	1%
WA Non-treaty Troll	1%
PS Treaty Troll	2%
PS Sport	15%
PS Treaty Net	4%
PS Non-treaty Net	1%
FW Sport	7%
Total	38%

Note that these predictions are for total Deschutes production and are not specific to fingerling production.

3.4) Relationship to habitat protection and recovery strategies.

3.5) Ecological interactions.

Predation/competition on listed fish by the yearling fall chinook program at Tumwater Falls are unknown at this time (Risk Assessment, WDFW, 2000).

Increasing pinniped populations in Puget Sound may be negatively affecting survival this program's production. Delay of returning adults at the outlet of Capitol Lake by inefficient passage facilities exacerbates this predatory impact.

SECTION 4. WATER SOURCE

4.1) Provide a quantitative and narrative description of the water source (spring, well, surface), water quality profile, and natural limitations to production attributable to the water source.

McKernan Hatchery that incubates and early rears the Tumwater Falls yearling program relies on a spring water source for its supply. The net pens sited in Percival Cove are adjacent to Percival Creek.

4.2) Indicate risk aversion measures that will be applied to minimize the likelihood for the take of listed natural fish as a result of hatchery water withdrawal, screening, or effluent discharge.

NA

SECTION 5. FACILITIES

5.1) Broodstock collection facilities (or methods).

Broodstock are collected at two locations: Percival Cove and Tumwater Falls Park.

Percival Cove: In the past, steel screens were placed over the mouth of the creek to block fish from entering the creek. Fish were netted out in front of the screens and taken to the Tumwater Falls for spawning. In the year 2000, a trap was installed. Adults can be collected also, if allowed, for passage of fish upstream.

Tumwater Falls: In 1954, construction was completed on a fish ladder to bypass Tumwater Falls on the Deschutes River. In 1961, two adult holding ponds were built at the end of the ladder to collect broodstock for the Tumwater Falls program. These ponds were later upgraded to allow for the rearing and release of juvenile chinook. Each pond is 20 ' X 100' X 5'. Water flow to each pond can be up to1,500 gpm. Fish climb the fish ladder and are diverted into the pond by a set of metal pickets. Fish jump over a finger weir into the pond.

5.2) Fish transportation equipment (description of pen, tank truck, or container used).

When transferring adult fish from Percival Cove to Tumwater Falls, a 1,000 gallon tank truck is used. Only 100 adults are transported per trip to Tumwater Falls. Percival Cove is less then 10 minutes from Tumwater Falls.

5.3) Broodstock holding and spawning facilities.

At Tumwater Falls, there are two holding ponds 20' X 100' X 5', each having 2 crowders and a brail system for processing the adults.

5.4) Incubation facilities.

Eggs are not incubated at either location. Eggs are transferred to other stations (McAllister Creek (2.7 million) and Minter Creek (2.1 million). Eggs are incubated, fish started, mass-marked and then transferred back to Tumwater/Percival Cove for acclimation and release. See HGMP's for other locations regarding loadings and incubation types.

5.5) Rearing facilities.

Rearing vessels for this program consist of 4 floating net pens 40' X 40' X 7' located in Percival Cove adjacent to Percival Creek (part of Capitol lake).

5.6) Acclimation/release facilities.

Net pens located in Percival Cove adjacent to Percival Creek (part of Capitol lake).

5.7) Describe operational difficulties or disasters that led to significant fish mortality.

None identified.

5.8) Indicate available back-up systems, and risk aversion measures that will be applied, that minimize the likelihood for the take of listed natural fish that may result from equipment failure, water loss, flooding, disease transmission, or other events that could lead to injury or mortality.

A staff person is on stand-by to respond to flooding events if pens are in danger. This may entail releasing fish earlier than normal.

SECTION 6. BROODSTOCK ORIGIN AND IDENTITY

Describe the origin and identity of broodstock used in the program, its ESA-listing status, annual collection goals, and relationship to wild fish of the same species/population.

6.1) Source.

Adult fall chinook returning to the Tumwater Falls fish ladder and to the Percival Creek trap.

6.2) Supporting information.

6.2.1) History.

The fall chinook run returning to the Deschutes River was founded in 1946 through the release of Green River Hatchery-origin fingerlings into the lower river, with the first egg takes at Deschutes resulting from adult returns occurring in 1949 and 1950 (WDF 1949; 1950). The existing chinook salmon return was established by, and sustained through, Green River stock hatchery releases. But since 1992, Deschutes River adult returns have been used exclusively for this program.

6.2.2) Annual size.

110 adults needed for yearling program (2,500 for total program).

6.2.3) Past and proposed level of natural fish in broodstock.

Unknown level of natural fish in past broodstocks.

6.2.4) Genetic or ecological differences.

None.

6.2.5) Reasons for choosing.

South Sound stock

6.3) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish that may occur as a result of broodstock selection practices.

SECTION 7. BROODSTOCK COLLECTION

7.1) Life-history stage to be collected (adults, eggs, or juveniles).

Adults.

7.2) Collection or sampling design.

Tumwater Falls trap captures 100% of returning fish to the Deschutes River. At Percival Cove, in 2000, a trap was installed to capture all fish entering Percival Creek. Trapping begins in August and ends in late October. Fish are selected over the entire run timing.

7.3) Identity.

All hatchery-origin adults are/will be 100% marked (adipose-fin clipped only).

7.4) Proposed number to be collected:

7.4.1) Program goal (assuming 1:1 sex ratio for adults):

110 adults (this number is included in the total broodstock collection of 2,500 adults at Tumwater Falls).

7.4.2) Broodstock collection levels for the last twelve years (e.g. 1988-99), or for most recent years available:

Year	Adults			Eggs	Juveniles
	Females	Males	Jacks		
1988					
1989					
1990					
1991					
1992					
1993					
1994					
1995	2,363	1,130	33	8,775,000	

Year	Adults			Eggs	Juveniles
	Females	Males	Jacks		
1996	1,981	868	37	8,080,500	
1997	1,582	871	21	6,728,000	
1998	1,093	1,086	16	4,604,000	
1999	1,281	1,281	1	5,636,700	
2000	1,051	1,068	3	4,863,000	
2001	1,136	1,194	4	5,109,000	

7.5) Disposition of hatchery-origin fish collected in surplus of broodstock needs.

All chinook excess to broodstock needs shall be passed upstream to spawn naturally as part of an experiment to test the relative reproductive success of hatchery fish spawning in the wild.

7.6) Fish transportation and holding methods.

At Tumwater Falls there are two holding ponds 20' X 100' X 5', each having 2 crowders and a brail system for processing the adults. Water flow to each pond can be up to1,500 gpm. The truck used to transport fish from Percival Cove is a 1,000 gallon tanker. Only 100 adults are transported per trip to Tumwater Falls. It has oxygen and aerators. Travel time between the Cove and Tumwater is 10 minutes.

7.7) Describe fish health maintenance and sanitation procedures applied.

The hatchery staff is guided by policies in the WDFW Fish Health Manual (1996) and the Co-Managers Fish Health Policy (1998).

7.8) Disposition of carcasses.

Carcasses are sold to a buyer who has a state contract to pick up all processed broodstock fish.

7.9) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish resulting from the broodstock collection program.

SECTION 8. MATING

Describe fish mating procedures that will be used, including those applied to meet performance indicators identified previously.

8.1) Selection method.

Spawners are selected randomly from the pond, checked for ripeness, processed or returned to the pond as green. Spawning occurs, on average, three days per week. Spawning runs from late September to late October. The peak of spawning is in mid-October. Spawning guidelines are followed as per Seidel (1983).

8.2) Males.

Males are spawned at a rate of one male per one female. 3 jacks per 100 males are used randomly in the spawning population.

8.3) Fertilization.

All gametes are transported on ice to McAllister and Minter Creek Hatcheries. Eggs are fertilized using one bag of milt (5 males) for 5 females (five fish pool).

8.4) Cryopreserved gametes.

Not applicable.

8.5) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish resulting from the mating scheme.

SECTION 9. INCUBATION AND REARING -

Specify any management *goals* (e.g. "egg to smolt survival") that the hatchery is currently operating under for the hatchery stock in the appropriate sections below. Provide data on the success of meeting the desired hatchery goals.

9.1) Incubation:

9.1.1) Number of eggs taken and survival rates to eye-up and/or ponding.

Program/facility does not have the capacity to incubate eggs. Due to this, the yearling group is eyed at McAllister Creek (300,000 eggs) and then are shipped to the McKernan Hatchery for hatching and early rearing.

9.1.2) Cause for, and disposition of surplus egg takes.

Surplus eggs are the result of better than expected survivals. Generally, these eggs are included with station production and released as fry/fingerlings not to impact the core program (the program production does not normally exceed the production goals outlined in the Future Brood Document).

9.1.3) Loading densities applied during incubation.

No incubation takes place at this facility.

9.1.4) Incubation conditions.

No incubation takes place at this facility.

9.1.5) Ponding.

Early rearing of these fish takes place at the McKernan Hatchery. Ponding is forced.

9.1.6) Fish health maintenance and monitoring.

Early rearing of these fish are done at Mckernan Hatchery. Fish health maintenance and monitoring is done according to the Fish Health Manual (1996) and Co-Managers Fish Health Policy (1998).

9.1.7) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish during incubation.

9.2) Rearing:

9.2.1) Provide survival rate data (*average program performance*) by hatchery life stage (fry to fingerling; fingerling to smolt) for the most recent twelve years (1988-99), or for years dependable data are available..

Due to the lack of starting capacity, Tumwater Falls/Percival Cove receive sub-yearlings from McKernan Hatchery and the fish are ponded for yearling release.

Survival information for this program is from transfer-in to release.

Year	% Survival

1995	94
1996	86
1997	83
1998	91
1999	96
2000	95

9.2.2) Density and loading criteria (goals and actual levels).

Goals
0.6 pounds per cubic foot (lbs/cubic ft.).

Achieved
0.5 lbs/cubic ft.

9.2.3) Fish rearing conditions

Temperatures range between 47 and 56 degrees Fahrenheit. Dissolved oxygen readings are taken as temperatures rise to ensure the health of the population.

9.2.4) Indicate biweekly or monthly fish growth information (*average program performance*), including length, weight, and condition factor data collected during rearing, if available.

(1998 brood numbers)

Month	Length	FPP	K-factor
1		21	
3	135	15	1.17
6	154	11	1.10

9.2.5) Indicate monthly fish growth rate and energy reserve data (*average program performance*), if available.

Month	FPP
1	21
3	6
6	4

9.2.6) Indicate food type used, daily application schedule, feeding rate range (e.g.

% B.W./day and lbs/gpm inflow), and estimates of total food conversion efficiency during rearing (*average program performance*).

Fish are fed Moore Clark "Fry" at recommended feeding levels. Fish are fed once a day, 3 days per week. Fish are feed to satiation. Feed rate is 1.0% to 2.0% B.W./day, not to exceed 0.1 lbs./gpm. Average food conversion is 0.9- 1.1:1.

9.2.7) Fish health monitoring, disease treatment, and sanitation procedures.

Fish are inspected as needed by the area fish health specialist. Gills, skin, and blood are checked for pathogens. A prescription is written to address treatments for any pathogens which may cause mortality in the general population. Sanitation is conducted according to guidelines set out in the WDFW Fish Health Manual (1996).

9.2.8) Smolt development indices (e.g. gill ATPase activity), if applicable.

Not applicable.

9.2.9) Indicate the use of "natural" rearing methods as applied in the program.

Not applicable.

9.2.10) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish under propagation.

SECTION 10. RELEASE

Describe fish release levels, and release practices applied through the hatchery program.

10.1) Proposed fish release levels.

Age Class	Maximum Number	Size (fpp)	Release Date	Location
Eggs				
Unfed Fry				
Fry				
Fingerling				
Yearling	200,000	8	April	Percival Cove

10.2) Specific location(s) of proposed release(s).
Stream, river, or watercourse: Deschutes River (WRIA 13.0028)

Release point: Percival Cove (mouth of Percival Creek WRIA 13.0029)

Major watershed: Deschutes River

Basin or Region: Puget Sound

10.3) Actual numbers and sizes of fish released by age class through the program.

Release year	Eggs/ Unfed Fry	Avg size	Fry	Avg size	Fingerling	Avg size	Yearling	Avg size
1988								
1989								
1990								
1991								
1992								
1993								
1994							166,870	7
1995							190,600	6
1996							170,900	7
1997							164,542	8
1998							190,985	9
1999							191,300	8
2000							188,980	9
2001							180,000	9
Average							180,522	8

10.4) Actual dates of release and description of release protocols.

Release Year	Life Stage	Release Range	Release Type
1996	Yearling	April/May	Volitionally
1997	Yearling	April/May	Volitionally
1998	Yearling	April/May	Volitionally
1999	Yearling	April/May	Volitionally
2000	Yearling	April/May	Volitionally

10.5) Fish transportation procedures, if applicable.

Fish transferred to Percival Cove are loaded on to 1,000 gallon tank trucks at McKernan and hauled for about an hour before being released into the net pens. Aerators and oxygen are used during the transfer and poundage does not exceed 1,200 lbs.

10.6) Acclimation procedures

Yearling fish are reared/acclimated on Percival Creek/Deshutes River water that exist in Capitol Lake.

10.7) Marks applied, and proportions of the total hatchery population marked, to identify hatchery adults.

WDFW is mass marking (adipose fin clip)100% of the fall chinook production released through the hatchery program each year. Additionally, WDFW shall apply coded-wire tags to a portion of the yearling production at Percival Cove to allow for evaluation of fishery contribution

10.8) Disposition plans for fish identified at the time of release as surplus to programmed or approved levels.

No surplus fish recieved

10.9) Fish health certification procedures applied pre-release.

A fish health specialists inspects the population for pathogens before release and gives the okay to release.

10.10) Emergency release procedures in response to flooding or water system failure.

If high flows endangered the net pens in the cove, the fish would be released into the lake.

10.11) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish resulting from fish releases.

SECTION 11. MONITORING AND EVALUATION OF PERFORMANCE INDICATORS

11.1) Monitoring and evaluation of "Performance Indicators" presented in Section 1.10.

Note: See section 1.10 for Monitoring and Evaluation. The purpose of a monitoring program is to identify and evaluate the benefits and risks which may derive from the hatchery program. The monitoring program is designed to answer questions of whether the hatchery is providing the benefits intended, while also minimizing or eliminating the risks inherent in the program. A key tool in any monitoring program is having a mechanism to identify each hatchery production group.

Each production group shall be identified with distinct otolith marks, adipose clips, coded wire tags, blank wire tags or other identification methods as they become available, to allow for evaluation of each particular rearing and/or release strategy. This will allow for selective harvest on hatchery stocks when appropriate, monitoring of interactions of hatchery and wild fish wherever they co-mingle in riverine, estuarine and marine habitats and assessment of the status of the target population. WDFW shall monitor the Chinook salmon escapement into the target and non-target Chinook populations to estimate the number of tagged, un-tagged and marked fish escaping into the river each year and the stray rates of hatchery Chinook into the rivers.

11.1.1) Describe plans and methods proposed to collect data necessary to respond to each "Performance Indicator" identified for the program.

See section 1.10.

These fish are 100% mass-marked (adipose-fin clip only) which will allow for selective fisheries (harvest opportunity) in mixed stock areas to minimize impacts on weak or protected stocks as well as identifying the hatchery fall chinook production and the NOR/HOR spawning ground ratios.

11.1.2) Indicate whether funding, staffing, and other support logistics are available or committed to allow implementation of the monitoring and evaluation program.

Funding and staffing committment to long term monitoring and evaluation is unknown at this time.

Funding and resources are currently committed to monitor and evaluate this program as detailed in the Resource Management Plan for Puget Sound Chinook Salmon Hatcheries (Washington Department of Fish and Wildlife and Puget Sound Treaty Tribes, August 23, 2002).

11.2) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish resulting from monitoring and evaluation activities.

Monitoring and evaluation will be undertaken in a manner which does not result in an unauthorized take of listed chinook.

SECTION 12. RESEARCH

Production of juvenile and adult chinook salmon from releases of hatchery adults into the Deschutes River, Washington

Note: The following proposal has been approved at this time. Also, the Deschutes River is defined as a "category 3" river/stream. This indicates that it has never had an indigenous run of chinook.

Submitted by Hatchery Evaluation and Assessment Team (H.E.A.T.)
Washington Department of Fish and Wildlife
Fish Program, Science Division

Background: The relative productivity of hatchery adult salmon and steelhead spawning naturally is largely unknown. Anecdotal information suggests that hatchery fish do successfully reproduce in the wild, however, successful natural reproduction past the F1 stage is not known. Currently several studies are addressing this issue relative to recovery efforts of listed chinook or steelhead. Previous studies using Skamania steelhead indicated this stock had similar survivals from the egg to smolt stage as native Kalama steelhead, but smolt to adult survivals were much lower than the native population. These data suggest that a self sustaining population of this stock would not occur in most situations because needed parent stock would continue to decline.

Use of various genetic techniques (such as DNA fingerprinting) have been proposed to study relative reproductive success of hatchery and wild origin spawners. This technique is already employed in two projects, one with steelhead on the Kalama River and one with coho on Minter Creek. The complexity of doing this kind of analysis with chinook salmon is cost prohibitive and logistically improbable because the chinook matures at ages 3-5. At least one study suggested that chinook salmon suffer less freshwater mortality but higher marine mortality than the other species of Pacific salmon (Bradford 1995). We estimate that the replacement rate of chinook salmon is 0.00044%, i.e. this is the rate of survival from egg deposition to adult return. If the rate lowers then run size is below replacement. Unfortunately, it is not known if this rate can be achieved for runs of chinook salmon that originate from hatchery stocks. Therefore, the following proposal seeks to determine this rate for hatchery chinook allowed to spawn naturally in the Deschutes River, Washington.

The Deschutes River originates in the Bald Hills southwest of Mount Rainier and flows northwest into Budd Inlet at Olympia, Washington. The river is nearly 80 km in length and contains few tributaries accessible to anadromous fish. Prior to 1953, a falls at the mouth of the river blocked upstream passage of anadromous salmonids, but after the construction of several fishways, coho fry were planted into the system to create a successful naturally reproducing run, which in recent years has declined to very low levels. Hatchery chinook were also introduced to the system to support Puget Sound tribal and sport fisheries. Nearly all returning fish are trapped at the WDFW facility located at the head end of the upper fishway at Tumwater Falls. However, in recent years some chinook have been passed upstream and based on recoveries of juvenile chinook in a screw trap located at the base of the lower falls, some successful reproduction has taken place.

Goal: The goal of the study is to measure survival rates of chinook salmon from the egg to smolt phase and the smolt to adult phase.

Protocol: To test the hypothesis that hatchery fish passed upstream to spawn naturally can achieve the survival to replacement rate (SAR) of 0.0005% [1]. To determine this we must measure the survival rates of two life stages; egg to smolt and smolt to adult. We propose to do this by passing up to 250 pairs of fish upstream of the Tumwater Falls collection facility. This escapement number represents a potential egg deposition of approximately 1,000,000 eggs. If the SAR is met a total of 250 pairs (50:50 sex ratio) from each brood should return under the scenario that no fishing mortality occurs. However, because fishing mortality will likely occur we will measure this by the recovery ratio of fish in the fishery to the number of fish escaping to spawn. We propose to pass fish upstream in four consecutive years beginning with the 2000 brood. Fish will enumerated through the use of a "VAKI River Watcher" electronic fish counter. Fish will be passed upstream in proportion to age-at-maturity (determined through scale analysis) and run timing. All natural fish will be passed upstream beginning with the 2005 brood and subsequent egg to smolt survival of the naturalized hatchery fish will be monitored in the same manner as in the initial phase of the study. Because of overlap in returns of natural and hatchery fish in broods 2003 and 2004, natural fish will be enumerated, but not passed upstream so that only hatchery fish will be allowed to spawn naturally.

The egg to smolt survival rate will be determined by obtaining an accurate fecundity estimate using fish that were not passed upstream as surrogates. This number will then be multiplied by the number of females passed upstream to calculate the total egg deposition potential (EDP). Surveys will be made periodically to determine the pre-spawn mortality rate and this estimate will be deducted from the EDP. Unmarked chinook smolts will be captured at the smolt trap located below Tumwater Falls. Trapping protocols have been

[1] Survival at replacement (SAR) is equal to: 2/average fecundity. For chinook we are assuming an average fecundity of 4,000 eggs, thus the SAR is 0.0005.

established for many years at this site and will continue throughout the duration of the study. Hatchery chinook stocked into Capitol Lake have missing adipose fins, making separation of natural and hatchery chinook caught in the trap relatively easy.

The smolt to adult survival rate (ASR) will be estimated made by applying coded-wire tags to a portion of the smolts captured. We will attempt to capture and coded-wire tag more than 25,000 smolts,. This should provide at least 125 recoveries of naturally produced chinook adults from the Deschutes system. However, this level of tagging is below the statistical minimum needed for comparison with hatchery survival rates. Thus, we will only attempt to determine the ASR for this stock of fish in the Deschutes River. Scientific technicians, in addition to those already operating the trap, will be hired so the trap can be operated for longer periods during the day and to facilitate the level of coded-wire tagging. Deviations from the predicted SAR and the measured SAR will be explained by the measurements taken of freshwater and marine survivals.

Study Site: Tumwater Falls hatchery and the Deschutes River.

Costs:

CWT's:	
(Up to) 50K:	**$4,440.**
Personnel (includes benefits):	
3 month Sci. Tech 3:	**$10,446.**
3 month Sci. Tech 2:	**$9,924.**
Sub-total	**$24,810.**
Overhead @ 23.5%	**$5,830.**
Equipment:	
Boots,raingear etc.:	**$200.**
VAKI Electronic Fish Cnter:	**$35,449.**
TOTAL	**$66,289.**

Matching

Personnel:	1 month Research Scientist 1
	4.5 months Fish Biologist 3
Equipment	Screw Trap
	Vehicles

12.1) Objective or purpose.

12.2) Cooperating and funding agencies.

12.3) Principle investigator or project supervisor and staff.

12.4) Status of stock, particularly the group affected by project, if different than the stock(s) described in Section 2.

12.5) Techniques: include capture methods, drugs, samples collected, tags applied.

12.6) Dates or time period in which research activity occurs.

12.7) Care and maintenance of live fish or eggs, holding duration, transport methods.

12.8) Expected type and effects of take and potential for injury or mortality.

12.9) Level of take of listed fish: number or range of fish handled, injured, or killed by sex, age, or size, if not already indicated in Section 2 and the attached "take table" (Table 1).

12.10) Alternative methods to achieve project objectives.

12.11) List species similar or related to the threatened species; provide number and causes of mortality related to this research project.

12.12) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse ecological effects, injury, or mortality to listed fish as a result of the proposed research activities.

SECTION 13. ATTACHMENTS AND CITATIONS

Washington Department of Fish and Wildlife and Western Washington Treaty Indian Tribes. 1998. Co-Managers of Washington Fish Health Policy. Fish Health Division, Hatcheries Program. Washington Department of Fish and Wildlife, Olympia, Washington.

Washington Department of Fish and Wildlife. 1996. Fish Health Manual. Hatcheries Program, Fish Health Division, Washington Department of Fish and Wildlife, Olympia,

Washington.

Seidel, Paul. 1983. Spawning Guidelines for Washington Department of Fish and Wildlife Hatcheries. Washington Department of Fish and Wildlife, Olympia, Washington.

Washington Department of Fisheries (WDF). 1949. Annual Report for 1948. Washington Department of Fisheries. Seattle, Washington.

Washington Department of Fisheries (WDF). 1950. Annual Report for 1949. Washington Department of Fisheries. Seattle, Washington.

Washington Department of Fish and Wildlife and Puget Sound Treaty Tribes, 2002, "Puget Sound Chinook Salmon Hatcheries, Resource Management Plan", a component of Comprehensive Chinook Salmon Management Plan, August 23, 2002. 103 pages.

SECTION 14. CERTIFICATION LANGUAGE AND SIGNATURE OF RESPONSIBLE PARTY

"I hereby certify that the foregoing information is complete, true and correct to the best of my knowledge and belief. I understand that the information provided in this HGMP is submitted for the purpose of receiving limits from take prohibitions specified under the Endangered Species Act of 1973 (16 U.S.C.1531-1543) and regulations promulgated thereafter for the proposed hatchery program, and that any false statement may subject me to the criminal penalties of 18 U.S.C. 1001, or penalties provided under the Endangered Species Act of 1973."

Name, Title, and Signature of Applicant:

Certified by_____ Date:_____

Table 1. Estimated listed salmonid take levels of by hatchery activity.

Listed species affected: Chinook ESU/Population: Puget Sound Activity: Yearling Chinook Program				
Location of hatchery activity: Percival Cove Dates of activity: ongoing: August-April Hatchery program operator: WDFW				
Type of Take	**Annual Take of Listed Fish By Life Stage *(Number of Fish)***			
	Egg/Fry	Juvenile/Smolt	Adult	Carcass
Observe or harass a)				
Collect for transport b)				
Capture, handle, and release c)		100,000		
Capture, handle, tag/mark/tissue sample, and release d)				
Removal (e.g. broodstock) e)			Unknown	
Intentional lethal take f)				
Unintentional lethal take g)	Unknown	2,000	Unknown	
Other Take (specify) h)				

a. Contact with listed fish through stream surveys, carcass and mark recovery projects, or migrational delay at weirs.
b. Take associated with weir or trapping operations where listed fish are captured and transported for release.
c. Take associated with weir or trapping operations where listed fish are captured, handled and released upstream or downstream.
d. Take occurring due to tagging and/or bio-sampling of fish collected through trapping operations prior to upstream or downstream release, or through carcass recovery programs.
e. Listed fish removed from the wild and collected for use as broodstock.
f. Intentional mortality of listed fish, usually as a result of spawning as broodstock.
g. Unintentional mortality of listed fish, including loss of fish during transport or holding prior to spawning or prior to release into the wild, or, for integrated programs, mortalities during incubation and rearing.
h. Other takes not identified above as a category.